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ABSTRACT

For the past three decades, the United Kingdom (UK) has been searching for the best methods of providing computer literacy and competence for elementary and secondary pupils. Initially, schools developed computer studies as a separate area of study instead of promoting the use of computers across the curriculum, an approach supported by the Micro-electronics Education Programme (MEP). The debate between these two approaches involved parents, pupils, and employers as well as MEP experts and inservice teacher educators. In 1987, upon realizing that the bulk of information technology resources in schools had been used only for students 16 years or older who were taking General Certificate of Secondary Education (GCSE) classes, the National Curriculum demanded an information technology dimension in each of the core subjects and a cross-curricular approach to information technology competence. Despite the good intentions of such educational changes, it remains to be seen if this new strategy can succeed in its aim to make information technology competence a natural part of every pupil's repertoire. (22 references) (DB)

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Computer Literacy in UK Education - an Evolving Strategy

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Summary

The quest for the best methods of providing computer/information technology literacy and competence for school pupils has taxed the British education system for almost three decades. This paper maps the various developments over this period and considers how the different viewpoints have contributed to the current position in which the conventional curricular subject, computer studies, is being actively discouraged as the prime vehicle for promoting information technology literacy.

The Development of Educational Computing

The idealogical debates and uncertainties currently surrounding educational information technology can be traced back to the early 1960s. Around that time a variety of computer professionals and educationalists began to meet under the auspices of the International Federation of Information Processing and, in the UK, under the auspices of the British Computer Society (Tagg 1987). They shared a common aim: to develop the role of computers in education.

Much of the early work in the UK was carried out more or less in abstraction with only tenuous access to computing facilities, for many of the schools involved, through the batch processing arrangements of local authorities or local industry. The first computer in a British school is said to have been installed in 1965 (Fothergill 1989) yet it was to be another fifteen years before the twin factors of local and central government funding and microcomputer development brought about a perceptible increase in the number of school based computers.

The early 1970s saw a major development in educational computing with many influential reports and innovative programmes arising nationally and internationally. (For a review of various European developments see Jensen, Gorny and other contributors to the European Journal of Education Volume 17, No. 4, 1982). In the UK the National Development Programme for Computer Assisted Learning (Hooper 1977) was the first fully evaluated project to examine the role of computers in educational institutions. As it closed (1977) the microcomputer was starting to feature as a viable proposition and the growth of interest in the issues of educational computing began to gather pace.

The Quest for Computer Literacy

Today's widely held perception of the need to develop what was initially known as 'computer literacy', and more latterly as 'information technology literacy', first gained currency in the mid-1970s when it was considered to be *"..educationally unsound to allow children to leave school without knowledge of a system which plays, and will continue to play, such an important part in their lives"* (Wilcomb 1977). The problem for schools, teachers and indeed many of its proponents was (still is?) that the concept of computer literacy was (still is?) not fully understood.

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The need to provide this computer literacy was being increasingly met in schools by the development of computer studies as part of the timetabled provision yet there had been a history of questioning dissent from this tendency towards making computer usage a specialism in the school. As long ago as 1969 the Scottish Education Department (Bellis 1969,1972) was arguing against the development of computer studies as a specialist subject and in favour of the use of computers across the curriculum. The growing realization that computing demanded a broader base in schools continued with Turnbull (1974) making the prophetic observation that *"..it would seem likely that the computer studies as known today will be replaced by an integration of computer awareness into the curriculum"* and Tagg (1977) foreseeing the demise of computer studies as pupils *"..become familiar with them [computers] by seeing them at work each day at school"*. The view that computer literacy could be provided through computer studies was frequently argued but many prominent computer educationalists (eg Coll 1980, Longworth 1982) were to continue criticizing the narrowness of the computer education which such an approach actually afforded at that time.

In 1979 the Government announced its intention to fund the development of educational computing in schools and in 1981 the Micro-electronics Education Programme (MEP 1981-86) and the Micros in Schools schemes were initiated. The MEP set out to provide curriculum development-cum-teacher education support with a view to making computers a natural part of pupils' learning and, by extension, their everyday lives. However, the battle lines were quickly drawn and the arguments began to rage about the manner in which schools should foster the computer literacy of their pupils.

Information Technology in Schools

Information technology in schools has been analysed in another paper (Gardner et al 1988) to conform to one or a combination of three main approaches: vocational, academic and cross-curricular. MEP worked hard to promote the cross-curricular approach in schools with, for example, a major programme of CAL development and of in-service teacher education in CAL across the curriculum (Aston 1986) but as an instrument of government once removed, so to speak, it remained largely persuasive. In the face of increasing pressure from parents, pupils and employers to provide school leavers with 'computer skills' for a perceived better employability, many schools opted for vocational and/or academic (ie. examination oriented) approaches. Despite the best endeavours of MEP and the local authorities the majority of schools chose to ignore the major curricular problems and settled instead for computer studies as a 16+ examination subject.

The nett effect of a discrete, timetabled approach to information technology is to make it a somewhat elitist concept which in many schools is only available to pupils in the fourth and fifth forms (14-16 years). The justification for computers in schools *per se* is widely conceded (but not necessarily unquestioningly by all concerned - see Scheffler 1986) but where the activity centres on computer studies the policy is challenged both on the elitist count and on its narrowness. With respect to the latter the literature abounds with comment from an 'information technology' lobby which, unfortunately, largely misses the point and argues simply for a broader syllabus than that represented by computer studies and which includes, for example, electronics (see for example Green 1985, Sparkes 1986 and Hammond and Edwardson 1987).

This debate of information technology versus computer studies (both in a discrete teaching subject form) is basically irrelevant because it is not able to address the central issue of providing a coherent information technology experience for <u>all</u> pupils in compulsory education (5-16 years). Behind the scenes, however, the cross-curricular lobby has continued to articulate a fundamentally different approach and two papers: Ruthven (1984) - proposing curricular strategies - and Birnbaum (1986) - proposing the fundamentals of information technology literacy and competency - are notable for

having found some measure of endorsement in the proposals of the National Curriculum

Information Technology and the National Curriculum

By 1987 the curricular position had matured and was ripe for a shock. The computer studies examination entries were still rising (computing had been by far the fastest developing subject at the 'Ordinary' and 'Advanced' levels of the General Certificate of Education) but some counselled against allowing the strength of this continuing growth to give rise to complacency in the face of curricular criticism. Round about the same time as Piddock (1987) was warning against *"..the development of a climate of opinion which makes it possible to brand the specialist study of computing as irrelevant, extravagant of resources"* and so on a letter from the DES to Chief Education Officers expressed concern about the lack of impact of computers in the teaching and learning of pupils and about the pupils' level of access to information technology (DES 1987). Before the year was out draft proposals for the National Curriculum emerged with a set of core and foundation subjects which did not contain computer studies. Clearly the 'persuasive' years of MEP and its successor the Micro-electronics Education Support Unit (MESU) had not made information technology accessible to all pupils and the Government prepared to prescribe school's information technology obligations in legislation.

The rôle of information technology in the curriculum may be thought of as being in one sense passive and in another sense active. In the passive sense it comprises a body of knowledge, a measure of understanding and a set of skills which, it is considered, the compulsory curriculum of schools should impart to all pupils. In the active sense, its functionality and permeation of every day life inevitably compels its use as a set of tools in the organization and delivery of teaching and learning processes in schools. This dual analysis leads to many difficulties for schools not the least of which include a pressing demand for staff development and a major drain on financial resources for equipment.

Until recently the bulk of the information technology resources in schools has been used for General Certificate of Secondary Education classes (GCSE at 16+ years) with little or no contact for the juniors, non-examination classes, non-computer studies classes or the sixth form (16-18 years). Even in GCSE groups, the effects of timetable clashes (eg. popular subjects at the same time as computer studies) and/or gender perceptions (eg. computers commonly viewed as machines for boys) have conspired to deny many pupils the opportunity of attaining the limited information technology competence available through the taught subject of computer studies.

One of the objectives of the National Curriculum proposals is to seek to remedy this situation by recognizing the importance of information technology as a concept which involves fundamental educational processes and skills *for all pupils*. In England and Wales the National Curriculum demands an information technology dimension in each of its core subjects and proposals for the subject of Design and Technology (DES 1989) also include a complete 'profile component' (TGAT 1987) for information technology which *"..aims to guarantee thereby a minimum entitlement to information technology experience for all pupils"*. In Northern Ireland information technology has not been given its own assessment vehicle (ie. profile component) and has been designated a fully *cross-curricular theme* which, by its nature, should not be divorced from any aspects of the total educational experience which a school offers. The view is taken that its techniques and processes should, for the most part, be assimilated rather than taught - with the latter teaching approach being reserved for the initial competences needed to work the machines and run the software. Furthermore this information technology experience should be available for all pupils, naturally and meaningfully, in as wide an educational context as possible. The Working Party on Information Technology as a Cross-Curricular Theme (NICC 1989) argues that pupils, on leaving

school at the end of their period of compulsory education, should possess an information technology competence based on:

- a knowledge of the nature and range of common information technology tools such as wordprocessors, databases and spreadsheets; specialized tools such as those for desktop publishing, communication, design, control, image-processing and sound-processing; and the ways in which such tools can integrate with each other;
- the skill to select information technology tools appropriate to a variety of contexts and tasks, and to employ them effectively, taking proper account of their limitations;
- an understanding that the skills and concepts which relate to information technology, when used appropriately and effectively, can enhance the quality of learning, living and working. (NICC 1989)

The Meaning of Cross-Curricularity

The cross-curricularity of a theme such as information technology can be considered to have two levels of meaning for the professional educationalist. In a narrow sense ...perhaps its more popularly understood sense... it is taken to mean that every subject in the time-tabled curriculum should *'do its bit'* in providing the necessary educational experiences. On the face of it this may seem innocent enough but once this approach strays into the area of 'teaching' information technology in the subject (eg. *"Today in history we are going to do databases"*) then the situation becomes contrived and to some extent counter-productive. Instead of information technology playing a natural rôle in the teaching and learning of history, history defers to the 'teaching' of information technology.

Clearly it can (and, for sometime to come, will) happen that pupils will not know how to use a database and the teacher will have to show them. In such circumstances, however, this exposition should be in the context of the proposed learning activity rather than as a narrow exercise in the technicalities of databases. It may be forced to be contrived but at least it remains meaningful in the learning context.

True cross-curricularity demands much more than a simple "*Do your bit*" request to the various curriculum subjects. In its wider sense, cross-curricularity is a property which dictates that information technology must diffuse throughout the curriculum in a manner which allows its attendant concepts, techniques and processes to be assimilated naturally by pupils - both through time and through usage. It has a rôle to play in every sphere of the curriculum and no one subject is an exclusive vehicle for the activities involved - they have a common ownership throughout the curriculum. The optimum situation is one in which the pupils and teachers are sufficiently at ease with the technology and its associated processes, that they choose to use information technology because it best serves their needs at the time.

The Challenges of the Evolved Strategy

There is no dodging the fact that such a prescribed -coercive rather than persuasive- approach to computer/information technology literacy has major implications for the way teachers plan and carry out their teaching. How can pupils choose an information technology tool 'naturally' to assist them in their learning if their teacher has never used a machine and may even be a little bit 'fearful' or indeed openly hostile to it? The National Curriculum and in particular its cross-curricular information technology, presents, therefore, a series of challenges to all teachers:

- to find out about information technology ... the machines and the software applications;

- to develop a measure (*each to their own*) of confidence and competence in the basic applications and techniques;
- to think about and be informed about the potential which information technology has in enhancing the teaching and learning of their subjects;
- to be ready for the opportunities which their lessons may present for using information technology appropriately and effectively.

Despite all the good intentions expressed above one question looms large. With the danger of teachers being forced, by an assessment driven curriculum, to teach to a set of attainment targets it remains to be seen if this new strategy can succeed in its aim to make information technology competence a natural part of every pupil's repertoire.

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